A8: Adjusting the mapping function to compensate for drifts in the scan space relative to the target space as described in A7 includes (i) identifying at least one pupil from the reflections of infrared light signals detected for a recent scan relative to the select recalibration time, (ii) determining a pupil center position for the at least one pupil in the scan space, (iii) identifying at least one glint from the reflections of infrared light signals detected for recent scan, the at least one glint corresponding in space to the at least one pupil, (iv) determining a glint center position for the at least one glint in the scan space, (v) determining a glint-pupil vector from the at least one glint center position and the at least one glint center position, (vi) determining a calibrating gaze position in the target space based on the glint-pupil vector, and (vii) adjusting the mapping function based on the calibrating gaze position.

A9: Identifying at least one pupil from the reflections of infrared light signals detected for a recent scan relative to the select recalibration time as described in A8 includes constructing at least one image of the eye from the detected reflections of infrared light signals and detecting the at least one pupil in the at least one image of the eye.

A10: Adjusting the mapping function based on the calibrating gaze position as described in A8 includes applying an offset to the mapping function, the offset selected such that an adjusted gaze position in the target space obtained from the mapping function and offset is consistent with the calibrating gaze position obtained in the target space.

A11: Determining the gaze position of the eye in the target space from the detected reflections of the infrared light signals for each scan includes (i) identifying a plurality of glints from the detected reflections of the infrared light signals for the scan, each glint associated with one of a plurality of scan subspaces, (ii) determining a glint center position of each glint in a respective scan subspace, and (iii) determining the gaze position relative to the target space based on the glint center positions.

A12: Determining the gaze position relative to the target space based on the glint center positions as described in A11 includes (i) applying mapping functions to the glint center positions to obtain corresponding intermediate gaze positions in the target space, where each of the mapping functions transforms coordinates from one of the scan subspaces to the target space, and (ii) combining the intermediate gaze positions to obtain the gaze position in the target space for the scan.

A13: At a select recalibration time during the eye tracking period, adjusting each of the mapping functions of A12 to compensate for drift in the respective scan subspace relative to the target space.

A14: Adjusting each of the mapping functions to compensate for drift in the respective scan subspace relative to the target space as described in A13 includes (i) from a recent scan relative to the select recalibration time, identifying a plurality of pupils from the reflections of infrared light signals detected for the recent scan, each of the pupils associated with one of the plurality of scan subspaces, (ii) determining a pupil center position for each of the pupils in a respective one of the scan subspaces, (iii) identifying a plurality of glints from the reflections of infrared light signals detected for the recent scan, each of the plurality of glints corresponding in scan subspace to one of the plurality of pupils, (iv) determining a glint center position for each of the glints in the respective scan subspace, (v) determining a glint-pupil vector from each set of pupil center position and glint center position in the same scan subspace, (vi) for each glint-pupil vector, determining a calibrating gaze position in the target space, and (vii) adjusting each of the mapping functions based on the respective calibrating gaze position.

A15: Identifying a plurality of pupils from the reflections of infrared light signals detected for the recent scan as described in A14 includes constructing a plurality of images of the eye from the detected reflections of infrared light signals and detecting the pupils from the images of the eye.

A16: Adjusting each of the mapping functions based on the respective calibrating gaze position as described in A14 includes applying an offset to the mapping function, the offset selected such that an adjusted gaze position in the target space obtained from the mapping function and offset is consistent with the respective calibrating gaze position obtained in the target space.

A17: Determining the gaze position of the eye in the target space from the detected reflections of the infrared light signals for each scan includes identifying a plurality of glints from the detected reflections of the infrared light signals for the scan. Upon identifying each glint, a glint center position of the glint relative to a scan space or a scan subspace is determined and the glint center position is transformed from the scan space or the scan subspace to the gaze position in the target space.

A18: Detecting reflections of the infrared light signals from the eye for each scan may include detecting reflections of each infrared light signal along at least two different paths.

In a second aspect, a method of displaying content to an eye in a target space in a field of view of the eye may be summarized as including projecting visible light to at least one exit pupil formed proximate the eye to form a virtual display in the target space over a first period and tracking a gaze position of the eye in the target space over a second period overlapping with the first period. Tracking a gaze position of the eye in the target space may include performing a plurality of scans of the eye with infrared light over the second period. Each scan may include generating infrared light signals over a scan period and projecting the infrared light signals from a number M>1 of virtual light projectors to the eye to form M illumination areas on the eye. Tracking the gaze position of the eye in the target space may further include detecting reflections of the infrared light signals from the eye for each scan and determining the gaze position of the eye in the target space from the detected reflections of the infrared light signals for each scan. The method further includes selectively adjusting the virtual display in the target space based on the gaze position.

The method according to the second aspect may further include one or more of the features described in B1 to B2 below.

B1: A trajectory of the gaze position of the eye from the detected reflections of the infrared light signals for each scan is determined.

B2: A plurality of exit pupils are formed proximate the eye, and the exit pupils are selectively enabled to receive, or disabled to not receive, a portion of the visible light based on the trajectory of the gaze position as described in B **1**.

In a third aspect, an eye tracking system may be summarized as including a scanning light projector including an infrared light source and at least one scan mirror, the scanning light projector to output infrared light signals according to a scan pattern; an optical splitter having a number M>1 of optical elements, each of the number M of optical elements to receive a subset of the infrared light signals outputted by the scanning light projector and create a virtual light projector for the subset of the infrared light signals; an optical combiner positioned and oriented to